EXTRALIFE RESEARCH

The ExtraLife Tinnitus Research Protocol

A Seven-Layer Investigational Framework Combining Peptides, Mitochondrial-Derived Peptides, Stem Cells, Molecular Hydrogen, Low-Level Laser Therapy, Neural Plasticity, and AI

Version 2.0 *| March 2026 | Investigational | Not Medical Advice*

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What's New in v2.0: Three mitochondrial-derived peptides (Humanin, MOTS-c, SS-31) with direct cochlear hair cell evidence, plus low-level laser therapy (LLLT) with an FDA-registered clinical trial for tinnitus.

Contents

1. Executive Summary

Tinnitus affects over 740 million people worldwide. There are zero FDA-approved cures. This white paper presents the ExtraLife Tinnitus Research Protocol: a seven-layer investigational framework that addresses tinnitus from every known angle simultaneously.

Version 2.0 expands the protocol with three critical additions: mitochondrial-derived peptides (Humanin, MOTS-c, SS-31) that have demonstrated direct cochlear hair cell protection in published studies, and low-level laser therapy (LLLT/photobiomodulation) currently in FDA-registered clinical trials for tinnitus.

The seven layers target: tissue repair (peptides), mitochondrial protection (MDPs), cellular regeneration (stem cells), oxidative stress reduction (molecular hydrogen), ATP production (laser therapy), brain retraining (neural plasticity), and continuous optimization (AI tracking).

What if the cure for tinnitus already exists — scattered across 47 papers in 9 languages — and nobody has connected the dots?

ExtraLife Collective connects them.

2. The Problem: Why Tinnitus Has No Cure

Tinnitus is the perception of sound in the absence of an external stimulus. It is a symptom with multiple etiologies:

- **Cochlear hair cell damage** — Noise, aging, and ototoxic drugs destroy inner ear hair cells. Human cochlear hair cells do not regenerate.
- **Mitochondrial dysfunction** — Damaged mitochondria in cochlear cells produce excess reactive oxygen species (ROS), creating a death cascade. *This is now understood as a primary upstream cause.*
- **Auditory nerve inflammation** — Chronic inflammation amplifies neural signals and creates phantom sound perception.
- **Maladaptive neural plasticity** — The brain compensates by increasing neural gain, "turning up the volume" on internal noise.
- **Central nervous system hyperexcitability** — The limbic system links tinnitus to anxiety, stress, and sleep disruption in a self-reinforcing cycle.

Tinnitus is a multi-system condition being treated with single-mechanism interventions. This protocol addresses all five pathways simultaneously.

3. The Hypothesis: A Multi-Layer Approach

The ExtraLife hypothesis: tinnitus can be meaningfully reduced through a synchronized multi-layer protocol addressing all etiological pathways:

Layer	Target	Intervention
1. Tissue Repair Peptides	Nerve repair & inflammation	BPC-157, TB-500, GHK-Cu, Selank
2. Mitochondrial Peptides ★	Mitochondrial protection	Humanin (HNG), MOTS-c, SS-31
3. Stem Cells	Hair cell regeneration	MSCs, exosomes, peptide priming
4. Molecular Hydrogen	Oxidative stress reduction	H2 inhalation, hydrogen-rich water
5. LLLT / Photobiomodulation ★	ATP production / cell energy	640nm laser (Erchonia HLS)
6. Neural Plasticity	Brain retraining	Psilocybin, neurofeedback, sound therapy
7. AI Tracking	Pattern recognition	Claudia AI biomarker analysis

★ = *New in v2.0*

4. Layer 1: Tissue Repair Peptides

Four peptides targeting nerve repair, systemic healing, extracellular matrix support, and neural calming.

BPC-157 (Body Protection Compound-157)

A 15-amino-acid peptide from human gastric juice. Upregulates growth factor receptors (VEGF, EGF, FGF), promotes angiogenesis, and accelerates tissue repair including nerve tissue. **Hypothesis:** BPC-157 may support cochlear nerve repair and reduce auditory pathway inflammation.

Dosing: 250–500 mcg/day subcutaneous. Intranasal delivery under investigation.

TB-500 (Thymosin Beta-4)

Promotes cell migration, differentiation, and anti-inflammatory activity. Stacked with BPC-157 for synergistic effect: BPC-157 targets local repair while TB-500 supports systemic healing.

Dosing: 2.0–2.5 mg twice weekly (loading 4 weeks), then weekly maintenance.

GHK-Cu (Copper Peptide)

Modulates gene expression — upregulates tissue repair genes, downregulates inflammation genes. May support the extracellular matrix around damaged cochlear structures.

Dosing: 1–2 mg/day subcutaneous.

Selank

Synthetic anxiolytic peptide modulating GABA and serotonin. Addresses the central processing side of tinnitus — the brain "stuck" in phantom sound perception.

Dosing: 250–500 mcg intranasal daily.

5. Layer 2: Mitochondrial-Derived Peptides (MDPs)

★ NEW IN v2.0

Mitochondrial-derived peptides are encoded by mitochondrial DNA itself. Since tinnitus fundamentally involves mitochondrial dysfunction in cochlear hair cells — excess ROS production, mitochondrial membrane collapse, and ATP depletion — these peptides work at the exact source of the problem.

Humanin (HNG — Humanin S14G)

A 24-amino-acid mitochondrial-derived peptide. The synthetic analog HNG is 1,000x more potent than natural Humanin. **Direct cochlear evidence:** Waldmann et al. (2023) demonstrated that exogenous Humanin showed significant protective effects on hair cells in organ of Corti explants exposed to gentamicin. Cortada et al. (2024), published in Nature Cell Death Discovery, confirmed that HNG protects cochlear hair cells against gentamicin-induced damage by activating the AKT survival pathway.

- **Mechanism:** Activates PI3K/AKT survival pathway in cochlear cells, inhibits apoptosis via BAX interaction, anti-inflammatory (reduces TNF-alpha, IL-6)
- **Evidence:** Waldmann et al. 2023 (BBRC) + Cortada et al. 2024 (Nature Cell Death Discovery)
- **Dosing (investigational):** HNG variant, dosing protocols under development

MOTS-c (Mitochondrial ORF of 12S rRNA Type-c)

A 16-amino-acid mitochondrial-derived peptide. Under stress, MOTS-c translocates to the nucleus and regulates antioxidant response genes. **Direct cochlear evidence:** Waldmann et al. (2023) showed MOTS-c increases AMPK-alpha phosphorylation in cochlear cells and demonstrated significant protective effects on hair cells.

- **Mechanism:** AMPK activation, NRF2/ARE antioxidant response, reduces IL-6/IL-1beta/TNF-alpha, supports mitochondrial homeostasis
- **Evidence:** Waldmann et al. 2023 (BBRC) + extensive metabolic/aging literature
- **Dosing (investigational):** 5–10 mg subcutaneous, protocols under development

SS-31 (Elamipretide)

A tetrapeptide that penetrates cell membranes and concentrates within mitochondria, where it binds to cardiolipin — a phospholipid critical for mitochondrial membrane integrity. **Direct cochlear evidence:** SS-31 conjugated nanoparticles showed mitochondrial-specific accumulation in hair cells and demonstrated the most favorable hair cell survival rates against gentamicin (PMC 2021).

- **Mechanism:** Cardiolipin binding, mitochondrial membrane stabilization, enhanced ATP production, reduced ROS

- **Evidence:** SS-31 hair cell targeting study (Drug Delivery, 2017/PMC 2021)
- **Dosing (investigational):** 5–40 mg subcutaneous, protocols under development

Why MDPs Matter for Tinnitus

Traditional peptides (BPC-157, TB-500) work downstream — repairing tissue after damage occurs. MDPs work upstream — preventing the mitochondrial dysfunction that causes the damage in the first place. The combination creates a bidirectional protection strategy: MDPs stabilize mitochondria and prevent hair cell death, while tissue repair peptides heal existing damage and reduce inflammation.

6. Layer 3: Stem Cell Therapy

Mesenchymal stem cells (MSCs) have anti-inflammatory and immunomodulatory properties and may support cochlear cell regeneration. MSC-derived exosomes carry signaling molecules that may be even more therapeutically relevant.

Key Research Questions

- **Delivery route:** Intratympanic vs. IV systemic — which reaches therapeutic concentration at the cochlea?
- **Exosomes vs. full MSCs:** Less invasive, potentially more targeted
- **Peptide priming:** Does pre-treating with BPC-157 + TB-500 for 4–6 weeks improve stem cell outcomes? (ExtraLife hypothesis)
- **MDP co-administration:** Can Humanin + MOTS-c protect transplanted stem cells from oxidative stress, improving engraftment? (Novel research question)

7. Layer 4: Molecular Hydrogen Inhalation

H_2 penetrates the blood-labyrinth barrier — something most drugs cannot do — and reaches the organ of Corti directly.

Published Evidence

- **Fransson et al. 2021** (Front Cell Neurosci): H_2 inhalation preserved outer hair cells and protected inner hair cell synaptic structures
- **Taura et al. 2022** (Front Neurosci): Human RCT — H_2 group: 39.0 dB vs controls: 49.5 dB at 3 months
- **Kurioka et al. 2014** (Neurosci Res): Significantly higher outer hair cell survival with 1.0–1.5% H_2

Protocol: 1–2 hours daily via nasal cannula (2–3% concentration) + H_2 water tablets for maintenance. Combined with hyperbaric oxygen at Eminent Wellness, Scottsdale.

8. Layer 5: Low-Level Laser Therapy (LLLT)

★ NEW IN v2.0

Photobiomodulation uses specific wavelengths of light to stimulate mitochondrial cytochrome c oxidase, the terminal enzyme in the electron transport chain. This directly boosts ATP production in damaged cells — addressing the same mitochondrial energy deficit that MDPs target, but from outside the body.

Clinical Trial: Erchonia HLS (NCT05091060)

The Erchonia HLS is a handheld, FDA-registered device currently in clinical trials for tinnitus symptom relief. The trial protocol:

- 640nm red laser wavelength
- 7.5 mW power output
- 10 minutes per session, daily for 8 consecutive weeks
- Self-administered at home via handheld device
- 4.5 Joules total energy per treatment
- ClinicalTrials.gov: NCT05091060

Mechanism for Tinnitus

- Red light at 640nm penetrates tissue and is absorbed by cytochrome c oxidase in mitochondria
- Stimulates ATP production in energy-depleted cochlear cells
- Reduces oxidative stress and inflammatory markers
- May promote microcirculation in the stria vascularis
- Non-invasive, zero side effects reported in trial protocol

Synergy with Other Layers

LLLT + MDPs create a powerful mitochondrial support system: SS-31 stabilizes mitochondrial membranes from inside the cell, MOTS-c activates protective gene expression, and LLLT stimulates ATP production via photon absorption. Three mechanisms, one target: mitochondrial health in the cochlea.

9. Layer 6: Neural Plasticity & Cognitive Retraining

While Layers 1–5 address biological hardware, Layer 6 addresses the software — the brain's maladaptive response.

- **Psilocybin microdosing:** 0.1–0.3g every 3 days (Fadiman protocol) for 8 weeks. Promotes neuroplasticity and disrupts maladaptive auditory patterns. Where legally available.
- **Neurofeedback:** EEG-based targeting of auditory cortex overactivity. Weekly sessions.
- **Notched sound therapy:** Customized to individual tinnitus frequency. Daily 30–60 min.
- **HRV biofeedback:** Nervous system regulation. Daily 10-minute sessions via wearable.
- **Desert grounding:** Sonoran Desert immersion at Scottsdale. Cortisol reduction, autonomic regulation.

10. Layer 7: AI-Powered Biomarker Tracking

Claudia — ExtraLife's multi-agent AI system — analyzes individual biomarker data and anonymized population-level patterns across the entire Collective.

- Full biomarker panels: inflammatory (hsCRP, IL-6, TNF-alpha), hormones (cortisol, testosterone, thyroid), metabolic
- Tinnitus Handicap Inventory (THI) scored weekly
- Audiograms at baseline and every 6 weeks
- HRV daily tracking via wearable
- Population-level analysis: which peptide combinations show the most improvement? What biomarker profiles predict response?

11. The Integrated 24-Week Protocol

Phase 1: Discovery & Priming (Weeks 1–6)

- Comprehensive baseline: biomarker panel, audiogram, THI, HRV
- Begin tissue repair peptides: BPC-157 + TB-500
- Begin MDPs: MOTS-c + Humanin (HNG)
- Begin Selank (intranasal, daily)
- Begin H_2 inhalation (1–2 hours daily) + H_2 water
- Begin LLLT: Erchonia HLS 10 min daily
- Daily HRV biofeedback

Phase 2: Stem Cell Intervention (Week 6–7)

- MSC or exosome delivery (route per research arm)
- Continue all peptides + MDPs
- Continue H_2 + LLLT
- Add SS-31 peri-intervention for mitochondrial protection of transplanted cells

Phase 3: Optimization (Weeks 7–18)

- Continue all peptides + MDPs at maintenance doses
- Add GHK-Cu
- Begin psilocybin microdosing (where legally available)
- Weekly neurofeedback + daily notched sound therapy
- Continue H_2 + LLLT
- Biomarkers + THI every 3 weeks
- Claudia AI analysis and protocol adjustments

Phase 4: Integration & Taper (Weeks 18–24)

- Taper peptides
- Continue LLLT + H_2 water (maintenance)
- Continue mind practices (HRV, sound therapy, grounding)
- Final comprehensive assessment
- Claudia generates 24-week report
- 6-month follow-up

12. Measurement Framework

Measure	Instrument	Frequency
Tinnitus severity	Tinnitus Handicap Inventory (THI)	Weekly
Hearing thresholds	Pure tone audiogram + ABR	Baseline, 6w, 12w, 18w, 24w
Inflammation	hsCRP, IL-6, TNF-alpha	Every 6 weeks
Hormones	Cortisol, testosterone, thyroid	Baseline, 12w, 24w
Nervous system	HRV (daily via wearable)	Continuous
Oxidative stress	8-OHdG, MDA	Baseline, 12w, 24w
Mitochondrial function	ATP/ADP ratio, MMP markers	Baseline, 12w, 24w
Sleep quality	Pittsburgh Sleep Quality Index	Every 6 weeks
Anxiety	GAD-7	Every 6 weeks
Subjective tinnitus	Visual Analog Scale (0–10)	Daily
Biological age	Epigenetic clock	Baseline, 24w

Note: v2.0 adds mitochondrial function markers (ATP/ADP ratio, mitochondrial membrane potential) to track the impact of MDPs and LLLT.

13. The ExtraLife Collective

This protocol is investigated through the ExtraLife Collective — a community-powered research network.

Active Research Bounties

- BPC-157 for tinnitus — cochlear nerve repair
- Stem cell therapy — MSC/exosome delivery optimization
- Psilocybin and neural plasticity
- Peptide protocol development
- AI-accelerated discovery
- Molecular hydrogen — H_2 inhalation for auditory protection
- **Mitochondrial-derived peptides — Humanin + MOTS-c + SS-31 for cochlear protection ★ NEW**
- **Low-level laser therapy — Photobiomodulation for tinnitus ★ NEW**

Join: **extralife.ai/research/tinnitus** | Fund: **extralife.ai/fund** | Call Claudia: **(866) 428-7106**

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